

A Local Farm Real Estate Price Index

BY
F. M. THRUN

Agricultural Experiment Station
Michigan State College
of Agriculture and Applied Science

ECONOMICS SECTION

East Lansing, Michigan

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CHAPTER I

STATEMENT OF THE PROBLEM

As is the case with other commodities, farm real estate prices are continually changing. At times these changes are so gradual as to be practically imperceptible, while at other times they become comparatively violent. Fluctuations in farm real estate values, moreover, are likely to be quite different in extent and direction in different sections of the country. Even in the same locality there are differences with respect to different parcels. Each sale of a parcel of real estate is accompanied by many individual and personal factors. As a result, the prices of some parcels move upward, while others remain stationary or move downward. Some move upward or downward rapidly, while others move gradually. In short, fluctuations in realty values are so diverse as to be on their surface confusing and unintelligible.

Due to this diversity of real estate price changes, the nature and extent of the changes can only be comprehended by noting the combined movement of the group. The more fundamental forces affecting real estate values tend to affect all parcels in a homogeneous region in a like manner. By noting the relative price change in the group, the accidental variations of individual items from the common movement become evident and may be removed from the picture.

The statistical device employed for measuring changes from period to period in a group of related items is the index number. The primary object of this study is the construction of a price index for farm real estate. Through the efforts of public and private statistical services and other research agencies, price index numbers have been constructed for a large number of important groups of commodities. Until recently, however, little has been done to develop such indices for real estate.†

A reasonable explanation of the failure to attack and to solve this problem in the past lies in the fact that the construction of a real estate price index presents certain inherent difficulties. In order to measure the extent of price variations in a standardized commodity such as wheat, the price of one period can be directly compared with that of another. For example, if the actual price of grade No. 1 winter wheat, on December first, was \$1.00 per bushel, and, on January first, went to \$1.25 per bushel, the extent of the price change is readily apparent, since the bushels of wheat are interchangeable. In the case of farm real estate such a direct comparison of prices is impossible, since every unit differs in some respect from every other unit. Within the same locality, and even with respect to adjacent parcels, there are differences of topography,

*Adapted from a thesis submitted to the graduate faculty of the University of Michigan in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

†Wyngarden, Herman—"An Index of Local Real Estate Prices."—Bureau of Business Research—University of Michigan. Jan. 1927.

fertility, soil and improvements. In general, there is no uniform price for real estate at any given time in any given locality. Price changes of real estate, therefore, can not be measured by the direct means commonly employed in calculating the price changes of standardized commodities. A different procedure has to be followed.

Sometimes the interest in price variations does not center in a single item, such as wheat, but rather in the combined movement of a group of related items. Methods of constructing index numbers for measuring such movements of a group of standardized commodities such as grains, livestock and dairy products have been devised and are widely used. It would appear, then, that such methods are applicable to real estate prices, since, in spite of the uniqueness of individual parcels of real estate, the values of these units, within certain defined areas, are undoubtedly affected by the same underlying economic events.

However, the common methods of index number construction are predicated on the availability of periodic price quotations of the various items in the group. But such periodic quotations of farm real estate prices are not available, since any given parcel of real estate is not bought and sold at regular intervals.

The lack of uniformity or standardization of real estate is not, however, restricted to differences in different parcels at any particular time, but very often applies to the same parcel at different periods. Changes in the larger improvements such as those brought about by addition or destruction of buildings, the cutting off of wood lots, irrigation or drainage quite obviously change the character of a parcel from time to time. In addition, there are less obvious changes, such as the depreciation of buildings and other improvements, changes in the fertility of the soil as affected by the manner of its utilization, and the even more subtle changes in the social environment. This requires that only those cases be included in the index concerning which there is assurance that no appreciable change in the physical character of the properties has occurred between the successive prices, nor any more general change in the social environment than that which may be presumed to affect the items in the group alike.

Perhaps the most serious obstacle that is met at the outset in any real estate price study is the difficulty of obtaining reliable sales data. There is no central agency which gathers or records this information. Every sale has its own particular price, and it is quite customary to conceal that price. It is true that very often a consideration is stated in the deed transferring the property but, as will be shown later, such information is exceedingly unreliable, both as to the consideration and the actual date of the sale.

The construction of a local farm real estate price index, which is our main objective, divides itself, therefore, into two problems:

First, the collection of sufficient farm real estate sales data of the required kind within the limits of a local area, such as a county, to warrant the construction of a price index.

Second, the development of a method for combining the data into a price index.

CHAPTER II

IMPORTANCE AND USES OF FARM REAL ESTATE PRICE INDICES

Before presenting the results of this study, it may be well to answer the implied question as to the importance and usefulness of farm real estate price indices.

A general answer to this question would be that the development of such indices is merely in harmony with the spirit of the day; that is, to subject the important elements of the business world, wherever possible, to some form of quantitative measurement. Sound business judgment and an intelligent public policy must be based on facts. With the ever increasing complexity of our economic life, the collection, presentation, and analysis of pertinent facts becomes of ever increasing importance.

According to the United States census, the estimated total value of farm real estate in 1920 was approximately sixty-six billions of dollars, representing roughly one fifth of our national wealth.* According to the 1927 estimate of the Bureau of Agricultural Economics, farm real estate furnishes the workshops and homes of about one-fourth of our population. Certainly the extent and character of fluctuations in value of an element of such great economic and social importance are bound to be of considerable significance. Subjected to quantitative measurement, many significant facts and relationships may be brought to light.

However, we do not have to be content with such a general answer to our question, for there are many applications at hand for such indices. A discussion of the nature of land values and the factors affecting them will assist in indicating some of these applications, and in suggesting problems that might be attacked with the aid of real estate price indices.

Unlike most commodities, land derives its value from the income it yields. This income may be either in the form of direct satisfactions as a home, or in the form of marketable products. In the past these direct satisfactions played a much more important role than they do today. The farmer of past decades was practically self-sufficient, producing most of the things required by himself and his family on the farm and in the home. The rapid development of manufacture coupled with the great strides in transportation have changed the status of the farmer to that of a specialist in the production of land products. His income, therefore, is becoming more and more a money income derived from the sale of the products he produces.

Theoretically, the value of any given piece of land is determined by capitalizing the expected annual income at the current rate of interest on investments of similar risk. The process is simple enough. The annual income being given, the prospective buyer or seller in arriving at a basis for pricing the land, merely finds that capital sum which, if invested at

*W. I. King—"The Net Volume of Saving in the United States." *Journal of the American Statistical Association*, September, 1922, p. 322.

the current interest rate, would yield the same annual income as that of the land.

In practice, however, this valuation process is complicated by many factors. In any given situation, the income attributable to the land is difficult to determine. From gross income the labor and capital costs must be subtracted before a net income figure is obtained. The absence of systematic accounts on farms usually makes it impossible to arrive at an estimate of these factors. In addition the personal equation enters very strongly since differences in ability of farm operators have an important effect on the income possibilities of farm property.

Moreover, the annual income from farm land is highly variable. Gross income varies with the price and per acre yield of the product. At times a bumper crop, if general, means a lower income to farmers than a poor crop selling at high prices. The farmer is constantly called upon to forecast the future regarding crop prices; whether to grow more wheat and less of some other crop; whether to market his crops directly or whether to use them in raising meat animals. Error in judgment in these matters cannot be immediately rectified because of the nature of agriculture. Consequently, from the immediate standpoint, the farmer must stand or fall on his judgment once the commitment has been made. In the case of single crop farming, the risk is even greater for there is not the opportunity of spreading the source of income over various products, so that failure in one may be offset, at least partially, by gains in another, as is the case in diversified farming.

Labor and capital costs, as well as charges against net income, such as taxes, vary from time to time. Manufacture and other employments compete with agriculture for the services of labor. With a general rise in wages the deduction from gross land income must be increased if the employment of the labor on the land is to be justified. Other things remaining equal, this greater deduction from gross income decreases the net income from which the capitalized value of the land is derived.

Usually in the discussions of the rate at which agricultural land incomes are capitalized, the prevailing mortgage rate of interest is assumed, since this is commonly held to be the alternative investment most comparable to land itself. Changes in this rate would have a proportional affect on the capitalized value of land income. There is little doubt but that there will be changes in this rate in the future, perhaps great changes in some sections due to modifications in our banking and credit system which tend to equalize this rate over the various sections of the country. The mortgage rate of interest, in turn, is related to the income yield over the whole field of investments. Changes in earnings on capital invested in industry generally, therefore, will have an effect on land values.

From what has been said regarding the nature of land valuations, it is apparent that the pricing of land is a highly speculative matter. In any community, however, there is apt to be a fairly crystalized consensus of opinion regarding normal land income yields and their future tendency. This prevailing opinion is based on experience and finds its expression in the real estate market. Buyers and sellers of farm

real estate attempt to estimate the yield of land and the most probable future changes in land income.*

Market values of land undoubtedly contain a large element of capitalized expected increases in land income.† In most sections of the country these expectations have been justified by the trend of land prices. But as land prices rise to higher levels, the question as to their future trend becomes of ever increasing importance. If land incomes become stabilized, in the sense that the prospect of future increases in income should disappear, land prices would decline.

The development of real estate price indices would pave the way for many inductive studies dealing with the causes of changes in land values. A price index gives a continuous curve of the average relative change in the group from period to period. It tells us when and how much the variations in price have been in the past.

Comparison of the long time trend of farm real estate prices with the curves of population, wages and interest rates would give some indication of the relationship of these factors to land values. These relationships, considered with other factors affecting land income in the United States, such as the rate of development of new land in other parts of the world, would open up the possibility of forecasting the general trend of land values.

The scientific forecasting of the general movement of land values could promote the interests of agriculture and investors in farm real estate in several ways. To the individual farmer, the price he pays for his land ordinarily represents the greatest portion of the investment on which he expects to earn an adequate return. As was shown above, a large element in the market price of land is based on expectations of the future, and ordinarily these expectations are little more than guesswork. Certainly, scientific forecasting can be expected to maintain a sounder relationship between land values and income.

The amount of long-term credit with which to purchase land or make permanent improvements in agriculture has increased tremendously with rising land values and rising prices of materials and labor. With the increase in the amount of credit, the time required by the individual borrowers in making repayment has also increased, with a resulting increase in the risk element in this form of credit. Before the passage of the Federal farm loan act, commercial credit agencies and individuals were the chief sources of this credit. These agencies, however, are not naturally equipped to provide adequate credit at a reasonable charge for the longer periods now required. With the establishment of the Federal and joint-stock land banks, a scheme was adopted whereby the bonds of these institutions, resting on real estate mortgages, may be

*The present value of an income increasing at a constant arithmetic rate is obtained by the formula:

$$V = \frac{a}{r} + \frac{i}{r^2}; \text{ e. g. } V = \frac{5.00}{.05} + \frac{.10}{(.05)^2} = 100 + 40 = 140$$

V—value of land; a—annual net income; i—increase in net income; r—rate of capitalization.

G. C. Haas, "Assessment of Farm Real Estate." Reprint from Proceedings of the National Tax Association. Vol. XVI—1924.

†Chambers, C. R.—"Relation of Land Income to Land Value." U. S. Dep't of Agriculture Bulletin, No. 1224, p. 30.

sold to the investing public. A more exact knowledge regarding past fluctuations and the probable future trend of land values would aid considerably in reducing the risk element in this type of credit, benefiting, as a result, both the borrowers and the lenders.

The great volume of bank credit based on real estate suggests another employment of a general farm real estate price index. The idea has frequently been expressed that rising land values exert a **lifting influence** on the whole price structure in that by means of bank credit, land values are liquidated into immediate purchasing power. It is not necessary to enter into the merits of this contention here, but changes in land values may be an important element in a general price index, the purpose of which is to measure changes in the purchasing power of money.

The inclusion of a general farm real estate price index as a part of such a general index may be urged on another ground. Although there are at present no available estimates as to the annual volume of sales of farm real estate, there is little doubt that for the country as a whole they run into huge sums. A general price index is therefore hardly complete unless farm real estate price changes are included. Professor W. I. King mentions an index of real estate prices, both urban and rural, as one of the necessary sub-index numbers to such a general price index.*

Variations in land values are of interest in other respects. In a territory of the wide extent and diverse character such as the United States, it is hardly to be expected that land values would be affected in the same manner in different regions and localities. Many factors affect land values in one or a few localities only, or at least more intensively than in other sections. The effects of world competition, or changes in methods not of general application, affecting the production of certain crops, may influence land values in different areas quite differently. For these reasons, local and regional indices may be expected to be of even greater interest than a single general farm real estate price index.

Comparisons of local and regional indices with the general farm real estate price index, with each other and with other indices would be significant. Do the trends of the various indices correspond fairly closely to the general trend or is there little uniformity in real estate price changes as between different localities? Are there any characteristic differences in the variations of real estate prices in different areas? Do variations in real estate prices in any area correspond fairly closely to crop value indices of the area or do they follow more closely fluctuations in general agricultural prices? Are farm real estate prices affected by the variations in prosperity of other important industries in the area and to what extent? Do indices based on a soils classification in a region display any significant differences?

Answers to these questions would lead to a better understanding of the forces affecting land values. Differences in the systems of production, marketing and credit could be analyzed in relation to their effect on land values. Certainly the information gained by such comparisons might be expected to lead to better methods of utilizing the land in some areas, or to suggest changes in the marketing or credit machinery.

*"Desirable Additions to Statistical Data on Wealth and Income." American Ec. Rev. March, 1927, p. 168.

Variations of farm real estate prices in particular localities and regions as compared with other business elements may disclose important time relationships even with regard to the short time movements. As a result, the forecasting of these minor variations above and below the general trend may, in a measure, become possible. In any event, the analysis and dissemination of the information displayed by local indices would tend to have a stabilizing influence on land prices and therefore on agriculture itself.

Local farm real estate price indices would also be of assistance in the administration of the property tax. Annually, state commissions are faced with the troublesome problem of equalization. With a careful, simultaneous assessment of all counties conducted by state authorities, local real estate price indices could be employed as a basis for equalization until the next general state assessment.

Obviously the present study standing alone is not suited for many of the uses outlined. However, the local index is the starting point. Regional indices and a general index can be constructed by later combining these local indices when the latter are developed.

CHAPTER III

COLLECTION OF THE DATA

Ingham county, located in the south central part of Michigan, was selected as the locus of this study. Convenience played a part in this choice, since this county is the home of Michigan State College.

Ingham county has a typically diversified agriculture, its chief farm products being oats, wheat, corn, hay, potatoes, beans, sugar beets and fruit, as well as meat, dairy and poultry products. These products are produced in varying proportions on practically all farms. A few specialized farms were encountered in this study, but these were small truck farms located near the city of Lansing. It was thought that Ingham county, because of the nature of its agriculture and location, would yield results typical of the diversified agricultural sections of the state.

The total area of Ingham county is approximately 353,920 acres. Of this total, about 90 per cent is rural property. Deducting 50,000 acres, included in marshes and other forms of unplowable pasture lands, excepting woodlands, and another 10 per cent as being ineligible for consideration in this study by virtue of its proximity to Lansing and other cities, 200,000 acres becomes, as an estimate, the total acreage of which our index is to be representative.

Obviously, it is desirable to have an index cover as long a period of time as possible. After the preliminary steps in obtaining the data had been taken, so that an estimate of the time and expense could be made, the period from 1890 through 1925 was selected. This period covers several complete swings of the general business cycle, and is long enough to display the long time trends.

The only feasible source of information regarding real estate transfers proved to be the Register of Deeds' records. All of the warranty deed and contract records, beginning with 1890, were systematically examined, and abstracts of farm real estate transfers were put on cards. The information taken in each case included: a description of the property, the names of the parties to the transaction, the consideration stated, the stamp tax, and the liber and page number of the record. Only descriptions of forty acres or more were taken in order to avoid cases in which buildings would represent the greater portion of the total value. Whenever the transfers were between persons having the same name, kinship was assumed, and no record of the deed was taken.

These cards were then filed, first by townships, and then by section numbers under the townships. By comparing the descriptions under each section, it was a relatively easy matter to obtain those cases which had been transferred more than once during the period under consideration.

The index, as was explained in Chapter I, must be based on successive sales of identical properties. In order to assure that only those cases were included in the index in which no appreciable changes in physical character had occurred between sales, it was necessary actually to view

the properties and to obtain information on that score by direct calls. This, however, was not the only reason which necessitated the fielding of these data. Many deeds do not state a consideration, and it was soon observed that even where a consideration is stated, it is often wrong. Many deeds, too, are given which do not represent a bona fide sale, but may represent a trade or a transfer, or may be given in security for a loan.

In the fielding calls an attempt was made to obtain information on the following points in each case: whether there had been a bona fide sale, and whether there had been changes in improvements, including the addition, destruction or depreciation of buildings and other minor changes such as, tiling, drainage through ditching, clearing of land, cutting off of wood lots. In addition, the price and date of each sale were verified.

At first it was thought advisable to keep a formal record of answers to these questions on separate cards for each case. This proved to be unnecessary, as the various changes in improvements were pointed out on the ground and a decision was immediately reached as to whether the case was to be discarded or not. In making decisions, depreciation of buildings was considered with respect to minor off-setting improvements, such as small out-buildings and fencing. The information obtained was always checked by the testimony of neighbors, and the older men in the locality.

In only one case was the desired information refused. Often the information could not be given by the persons on the property, or by neighbors. In many cases, however, the addresses of persons having the information were obtained, and these persons were then interviewed.

The unreliableness of deeds and the information stated in them as a basis for price studies, when unverified by fielding, is clearly demonstrated in Table (I). One hundred and twenty-eight possible cases were discarded because of major improvements between sales dates. Out of a total of 2,254 transfers obtained from the Register of Deeds which appeared to be bona fide sales, 267 represented transfers other than sales.

TABLE 1.—RESULTS OF "FIELDING"

Not bona fide sales.....	267
Joint deeds	20
Trades	167
Kinship	30
Mortgage deeds	50
Price wrong—corrected	58
Date wrong—corrected	44
Total—incorrect sales information on records.....	369
Price not given, but obtained.....	159
No reliable price information obtainable.....	111
Changes in improvements.....	128
Depreciation	16
New buildings	81
Buildings destroyed	4
Miscellaneous	27

In 328 cases, the prices were either not stated or were found to be incorrect. In 44 cases, the date of the transfer was stated as being identical with that of the deed, when, as a matter of fact, a sales contract had preceded the giving of the deed by a number of years.

Since a limited number of parcels of land are sold annually, the price index must be based on a "sample." The results obtained from the "sample" are assumed to be representative of the larger universe from which they are drawn. "The prerequisites of successful sampling are randomness in the process, and adequacy in the size of the sample. Randomness implies that the observation of individuals shall not be subject to any bias whatsoever, but shall be determined on principles of pure chance. Adequacy in the size of the sample implies that the number of cases included shall be large enough to allow the principles of probability to operate dependably."*

It appears that the sample upon which the index in this study is based meets the test of randomness. The data were selected at random in the sense that all properties selling more than once during the period, and meeting the requirement of homogeneity are included in the sample. The more rapid turnover of some properties as compared to others is not necessarily an indication that the prices of these properties are changing more rapidly than those of other properties not coming to market so frequently. Changes in the personal condition and fortune of the owners, and their attitude of mind with respect to price inducements are the usual circumstances leading to the sale of farm real estate. Death, old age, inheritance, illness and other shifts in fortune are among the more usual events leading to an offer of sale of farm property. Furthermore, some individuals purchase farms, not merely for the purpose of farming, but also with the idea of selling whenever a favorable offer might be forthcoming. Other individuals are not so speculatively minded but are primarily interested in operating the land. As a result, some properties may change hands rather frequently in a given period while others remain in a family for generations. The circumstances governing the frequency of sale of particular properties are therefore largely accidental.

Since the frequency of sale is not caused by any distinctive characteristics of the property, while on the other hand all sales in a given period are governed by similar circumstances irrespective of frequency of sale, it does not appear that any bias with regard to extent or direction of price movements is introduced as a result of basing the selection of the sample on multiple sales of the property. The possibility of bias as regards the greater representation of certain types or grades of land is discounted by the fact that 700 different parcels of farm real estate are included in the index, totaling 48,838 acres—nearly one-fourth of the estimated area.

As to the size of the sample, the number of cases is not as great as might be desired. The total number of sales included in the index is 1,648, averaging 45 $\frac{1}{2}$ sales a year. The total acreage represented in the sales is 113,639 acres. The chief weakness lies in the fact that in certain years the sales are so few as to cast a doubt on the representativeness of the index for those years. Especially is this true in the last few years

*Day, Edmund E., *Statistical Analysis*, p. 32.

of the index. Table (II) indicates by years the number and acreage of the sales on which the index is based.

It will be observed in Chapter IV, however, that the index for each year is the result of an average of averages. In general, the averages of samples in each group are so closely grouped about their average as to lend confidence in the representativeness of the final results.

TABLE II.—Number and Acreage of Sales Included in Index

Year	No of Sales	Acreage	Year	No. of Sales	Acreage
1890	30	2141	1908	64	4144
1891	42	2357	1909	83	5831
1892	38	2614	1910	70	4770
1893	44	2954	1911	81	5966
1894	39	2754	1912	58	4469
1895	28	1699	1913	41	3298
1896	31	2050	1914	18	1254
1897	34	2055	1915	35	3023
1898	46	2985	1916	45	3551
1899	67	4350	1917	30	2171
1900	47	3282	1918	43	3254
1901	50	3521	1919	52	3838
1902	83	5474	1920	46	3339
1903	68	4458	1921	29	2123
1904	67	4044	1922	18	1261
1905	60	3930	1923	8	401
1906	61	4338	1924	15	1064
1907	65	3940	* 1925	12	886

CHAPTER IV

CONSTRUCTION OF THE INDEX

In combining the sales data into an index, the first step was to compute price relatives, that is to find the percentage that later sales prices of a piece of property were of its first price. In order to do this, work cards of each case were made, containing the dates and prices of each sale. The relatives were then computed and entered on the cards. The township and section numbers were also written on the cards in order that the original data might be referred to whenever desired.

TABLE III—Sample of Work Card—Giving Date, Price, and Price Relative

ALAIEDON—Section 11, 160 Acres

Date	Price	Relative
1890	4,500	100
1894	5,000	111

In the case of properties which were sold more than twice during the period, the relationship of each sale price to that of the first time it sold was computed. In addition, the ratio of the sale price of each parcel to its price at the last preceding sale was taken. This procedure resulted in using a few sales more than once in computing the index. It happens that the additional relatives so obtained considerably strengthened several lean years. Furthermore, the ratios of successive sales were apt to be less erratic than those ratios of prices between which a greater interval of time intervened. Possible inaccuracies in fielding would contribute to this result, since the greater the interval of time, the less possible it becomes to check accurately and evaluate changes in improvements.

Next, the average of the relatives having a common base was computed for each year. For this purpose, the work cards were sorted by base years and the relatives transcribed to tables. Table (IV) below is a part of such a table for the relatives based on 1890.*

Three of the parcels first sold in 1890 were resold in 1891. Each of these resales gives some indication as to the course of prices between those years. The average price relative between 1890 and 1891 was found to be 102. By averaging the relatives in the columns under the years, an index of price changes with 1890 as the base was obtained. Similar computations for the price relatives based on the other years, gave a series of thirty-four distinct indices.

In averaging the price relatives, the arithmetic mean was employed because of the relatively few cases in any column. In some cases, where the larger number of relatives warranted, the arithmetic averages of

*The complete table for all years, as well as the case cards of the individual real estate transfers, are on file in the Economics Department of Michigan State College.

the three or more median items was taken. The number of cases included in the column was placed below the average in the table, as these numbers were used in the next step.

TABLE IV—Price Relatives of Parcels of Farm Real Estate in Ingham County First Sold in 1890, Placed Under the Years of Subsequent Resale.

1890	1891	1892	1893	1894	1895	1896	1897	1898	1899
Base	106	100	120	111			71	123	88
Year	100	110	99	100			87	113	95
	100		100				93		76
									82
									100
									82
Aver-									
age	102	105	107	105			83	118	85
Number	3	2	3	2			3	2	6

At this point in the computations, there were thirty-four separate indices, each based on a different year. Apparently link-relatives could have been computed in each index, and these link-relatives, in turn, averaged together.* There were, however, a large number of gaps in any one of the thirty-four indices. In addition, many of the averages in each index are based on very few, even single cases. A direct comparison of each of these with the next preceding average, therefore, yielded highly erratic results.

In order to avoid these difficulties, each average of relatives was transformed into link-relative on the basis of the average link-relatives already computed. These link-relatives were then averaged and in turn formed the basis for computing the link-relatives for the next year. In effect, this method simply means the direct computation of the average relationship of each year to the preceding year on the basis of all the sales in the given year.

Table (V) gives a section of the price relatives and averages based on the years 1890, 1891, 1892, 1893. The average relationship of 1891 to 1890 is 102. This is the only link-relative for these two years, and it was entered in the final results. The next step was to find the average relationship between 1891 and 1892. Based on 1890, the average price relative for 1892 is 105. Since 1891 is 102 per cent of 1890, the relationship of 1892 to 1891 would be as 105 to 102, namely, 103.

The average of the price relatives of 1892 based on 1891 is 99. In order to find the average relationship, or the link-relative, between 1891 and 1892, the 99 and 103, previously derived, were averaged. In doing this, each was weighted by the number of cases on which it was based. This minimizes the effect of average price relatives based on only one or two sales. The arithmetic mean was again employed because of the small number of cases. As in the averaging of the price relatives, extreme items on each end, when arranged in order of magnitude, were struck off.

*This is the method employed by Mr. Wyngarden. His study was based on "listing" prices obtained from real estate firms, which gave him a larger number of cases in each bracket. Op. Cit. Supra, p. 2.

TABLE V.—Fragment of Price Relative Tables of Various Base Years.

1890	1891	1892	1893	1894
Base Year	106 100 100	100 111	120 99 101	111 100
Average.....	102	105	107	105
Number.....	3	2	3	2
Link-Relatives.....	102	103	105	99
	Base Year	104 110 107 92 88 90	100 99 123 111 101	119 105
	Average.....	99	107	112
	Number.....	6	5	2
	Link-Relatives	99	107	106
		Base Year	111 96 100	89 90 108 124 106
		Average.....	102	103
		Number.....	3	5
		Link-Relatives	102	98
			Base Year	86 100 102 107 100 111
			Average.....	102
			Number.....	6
			Link-Relatives	102
Average Link- Relatives.....	102	100	105	101
Sum of Weights....	3	8	11	15

Table (VI) illustrates the running table which was constructed to facilitate the conversion of the price relative averages into link-relatives. The average of relatives in 1893 based on 1890 is 107. 1892 on the average is 102 per cent of 1890, so that 1893 is to 1892 as 107 is to 102. The result is 105. The link-relative of cases based on 1891 is 107, and of the cases based directly on 1892, 102. The weighted average of these link-relatives is the final result, namely, 105. Table (VII) gives the link-relatives, the number of cases on which each is based, and the resulting weighted averages.

The combined index was, at this stage, in link-relative form. In order to express each year as a percentage of some base year, it was necessary

to "chain" these links. This was done by dividing the base year, which was given a value of a hundred, by the link-relative of that year. This gave the value of the year preceding the base year. This value, in turn, was divided by the link-relative of the year, and the resulting quotient then divided by the next link-relative.

For the years following the base year, the values were multiplied by each succeeding link. The value of the base year being 100, that of the next year was the same as the link-relative for that year. The following year was found by multiplying the value of the preceding year by the link-relative of the year being computed. Table (VIII) gives the combined link-relatives and the chained index with 1913 taken as the base.

TABLE VI—Relationship of Each Year to Various Base Years.

	1891	1892	1893	1894
1890.....	$102 \times 100 = 102$	$102 \times 105 = 107$	$107 \times 101 = 108$	
1891.....		$100 \times 105 = 105$	$105 \times 101 = 106$	
1892.....			$105 \times 101 = 106$	

TABLE VII—Link-Relatives Computed from the Averages of Price Relatives Shown in Table (IV), with the Number of Sales each is based on (in parenthesis), and the weighted averages of these Link-Relatives.

	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901
		(3) 102	(2) 103	(3) 105	(2) 99	(1) 98	(4) 89	(3) 82	(2) 128	(7) 87	(3) 100	(3) 112
			(6) 99	(5) 107	(2) 106	(4) 105	(3) 93	(2) 75	(5) 107	(3) 93	(1) 80	(1) 105
				(3) 102	(5) 98		(3) 85	(2) 92	(1) 111	(3) 103	(6) 107	(1) 106
					(6) 102		(2) 100	(5) 98	(4) 98	(4) 83	(6) 114	(1) 106
								(3) 105	(2) 124	(6) 94	(1) 93	(1) 93
								(3) 86	(1) 126	(6) 96	(1) 107	(2) 105
									(6) 110	(6) 100	(5) 120	(1) 103
									(5) 105	(4) 110	(6) 114	(1) 101
											(2) 111	
Sum of Weights		3	8	11	15	5	12	18	26	39	31	11
Weighted Averages		102	100	105	101	103	91	91	108	95	110	104

Table VII—Continued

	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913
	(6) 108	(5) 98	(1) 84	(2) 97	(3) 96	(3) 98	(1) 95	(1) 102	(3) 103	(2) 113	(2) 78	(1) 97
	(4) 95	(3) 94	(1) 118	(2) 101	(3) 101	(1) 109	(3) 100	(2) 107	(2) 99	(1) 74	(3) 118	(2) 87
	(3) 92	(4) 100	(1) 107	(1) 99	(3) 110	(2) 95	(3) 108	(2) 86	(2) 112	(1) 119	(2) 101	(1) 95
	(2) 99	(2) 100	(3) 109	(1) 86	(2) 99	(1) 118	(1) 104	(3) 112	(1) 126	(6) 106	(2) 90	(1) 125
	(3) 117	(1) 100	(6) 103	(1) 105	(1) 98	(3) 104	(1) 104	(5) 96	(3) 116	(1) 101	(3) 109	(1) 101
	(2) 104	(1) 98	(5) 95	(3) 94	(3) 106	(3) 99	(1) 108	(2) 108	(1) 103	(4) 116	(1) 106	(1) 87
	(5) 103	(2) 103	(5) 103	(5) 99	(4) 90	(4) 102	(2) 104	(11) 102	(2) 127	(5) 110	(5) 95	(2) 106
	(4) 107	(6) 102	(10) 105	(6) 102	(1) 113	(3) 104	(2) 96	(5) 96	(3) 101	(4) 110	(4) 102	(2) 102
	(6) 98	(5) 109	(6) 106	(8) 99	(4) 90	(10) 102	(4) 100	(10) 102	(4) 115	(5) 106	(4) 110	(2) 92
	(5) 111	(8) 105	(2) 105	(4) 96	(8) 106	(6) 103	(9) 109	(6) 104	(2) 100	(5) 103	(1) 103	(2) 87
	(5) 103	(9) 104			(5) 100	(2) 96	(4) 101	(6) 106	(2) 117	(4) 106	(6) 100	(3) 106
					(12) 104	(8) 103	(5) 106	(7) 96	(7) 107	(3) 113	(10) 112	(2) 114
					(6) 101	(3) 102	(2) 101	(6) 104	(6) 113	(7) 116	(3) 118	(3) 109
							(2) 103	(3) 104	(2) 117	(16) 106	(4) 115	(1) 107
							(7) 103		(3) 102	(7) 111	(5) 113	(7) 117
									(2) 98			(2) 116
									(8) 104			
									(10) 111			
Sum of Weights	45	46	40	33	55	49	47	66	63	71	55	33
Weighted Averages	104	102	104	199	103	102	106	102	109	109	107	106

Table VII—Concluded

	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925
	(1) 110	(2) 83		(1) 94	(1) 91	(2) 98	(1) 92	(1) 107	(1) 80	(1) 96	(1) 112	(1) 101
	(1) 118	(2) 117	(1) 114	(3) 102	(1) 94	(2) 115	(1) 98	(1) 102	(1) 126	(1) 79	(1) 82	(1) 104
	(1) 97	(2) 90	(1) 105	(1) 123	(1) 96	(1) 118	(1) 87	(1) 93	(1) 111	(1) 106	(1) 101	(1) 80
	(3) 101	(1) 107	(2) 93	(2) 105	(3) 103	(5) 116	(1) 100	(1) 108	(1) 63	(1) 83	(1) 86	(1) 85
	(1) 106	(3) 105	(1) 95	(2) 94	(4) 96	(3) 120	(2) 115	(2) 90	(1) 94	(2) 96	(1) 89	(1) 77
	(5) 106	(3) 87	(2) 114	(1) 118	(3) 90	(5) 114	(1) 115	(2) 91	(2) 96	(1) 95	(1) 94	(1) 90
	(2) 104	(1) 116	(2) 104	(4) 113	(1) 128	(3) 100	(1) 87	(1) 100	(2) 100	(1) 106	(1) 95	(2) 107
		(4) 96	(3) 100	(4) 101	(3) 106	(4) 118	(4) 102	(1) 85	(1) 107	(2) 98	(1) 97	(1) 108
		(1) 111	(2) 104	(3) 106	(3) 102	(4) 115	(3) 108	(1) 89	(1) 123	(2) 84	(1) 76	(2) 83
		(9) 95	(2) 113	(1) 100	(5) 108	(5) 108	(4) 112	(2) 88	(1) 99	(2) 102	(1) 115	(1) 81
		(3) 97	(4) 113	(3) 91	(2) 107	(1) 129	(6) 114	(1) 97	(1) 96		(1) 121	(4) 91
		(4) 101	(3) 119	(4) 109	(2) 104	(3) 101	(2) 100	(2) 97	(2) 102		(1) 98	(1) 89
		(1) 100	(4) 103	(1) 112	(2) 103	(4) 118	(4) 113	(1) 85	(2) 128		(1) 114	(2) 103
			(1) 115	(2) 121	(1) 99	(4) 111	(1) 95	(2) 89	(1) 98		(1) 127	
			(2) 111	(1) 109	(4) 96		(2) 100	(1) 86	(1) 88		(1) 71	
			(1) 110		(8) 102		(2) 107	(1) 91	(2) 102		(2) 110	
					(2) 106		(2) 116	(1) 99	(2) 104		(1) 93	
							(5) 104	(2) 109	(1) 100		(3) 85	
							(11) 118	(1) 128			(1) 85	
								(3) 103				
								(6) 106				
								(3) 105				
Sum of Weights	14	36	36	33	46	46	54	37	24	14	22	19
Weighted Averages	105	92	111	106	102	111.5	109	96.5	98	95	97	93

TABLE VIII—Combined Link-Relatives Chained into an Index with 1913 as Base.

Year	Link-Relatives	Chained Index	Year	Link-Relatives	Chained Index	Year	Link-Relatives	Chained Index
1890		54.9	1902	104	62.2	1914	105	105
1891	102	56.1	1903	102	63.5	1915	92	96.6
1892	100	56.1	1904	104	66.1	1916	111	107.2
1893	105	58.9	1905	99	65.5	1917	106	113.6
1894	101	59.5	1906	103	67.5	1918	102	115.9
1895	103	61.3	1907	102	68.9	1919	112.5	130.4
1896	91	55.8	1908	106	73.1	1920	109	142.1
1897	91	50.8	1909	102	74.8	1921	96.5	137.1
1898	108	54.9	1910	109	81.6	1922	98	134.3
1899	95	52.2	1911	109	88.1	1923	95	127.6
1900	110	57.5	1912	107	94.3	1924	97	123.8
1901	104	59.8	1913	106	100.0	1925	93	115.1

CHAPTER V

SOME COMPARISONS

The "chained" index resulting from the computations in the preceding chapter is plotted in Chart (I). There was a slight rise in farm real estate prices in the county during the years 1890 to 1895, and a falling off of prices during the next five years. Beginning with 1900, farm land prices started on an upward movement that remained unchecked until the severe depression of 1921.

In general, farm land values may be expected to follow variations in crop values quite closely. A comparison, therefore, of the farm real estate price index with an index of crop values would be of interest in bringing out the relationship between these elements. In order to do this, a crop value index for Michigan was computed from data obtained from the annual summary of crop reports.* Prices of each crop are given as of December first, as well as the total yield and acreage for each year. The total value of all crops was obtained by multiplying the yield in each case by the price and adding the results. The per acre value was obtained by dividing the total value of all crops by the number of acres. The per acre value of each year and the index based on 1913 is given in Table (IX). A better indicator of changes in gross income from farm land would perhaps be obtained if a correction in the crop value index could be made for quantities used in feeding live stock, and a combination index of crop values and live stock values computed. The data for such an index, however, are not available.

*Crop Report for Michigan—Verne H. Church—U. S. Agricultural Statistician.

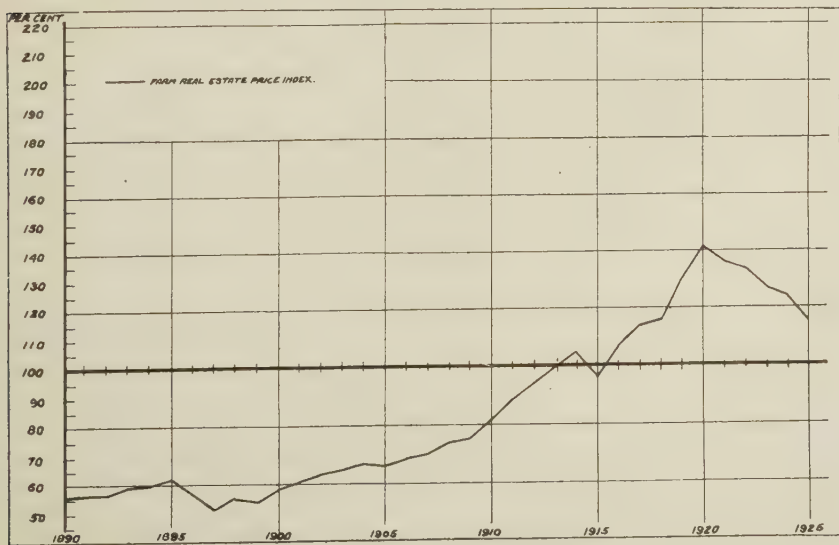


Chart I—The Index of Farm Real Estate Prices in Ingham County, Michigan, from 1890 to 1925.

TABLE IX. Per Acre Crop Value Index for the State of Michigan.

Year	Per Acre Value of Crops	Per Cent of 1913 Values
1890	12.91	74.4
1891	14.22	81.9
1892	11.03	63.6
1893	10.71	61.7
1894	10.50	60.5
1895	8.29	47.8
1896	9.16	52.8
1897	11.08	63.9
1898	11.37	65.5
1899	8.77	50.5
1900	10.58	60.9
1901	13.74	79.2
1902	13.30	76.7
1903	13.92	79.1
1904	13.04	75.2
1905	13.72	79.1
1906	13.15	75.8
1907	15.16	87.4
1908	16.60	95.7
1909	17.16	98.9
1910	17.08	98.4
1911	20.60	118.7
1912	16.80	96.8
1913	17.35	100.0
1914	19.51	112.4
1915	19.09	110.0
1916	23.30	134.3
1917	33.77	194.6
1918	31.95	184.1
1919	36.07	207.9
1920	28.92	166.7
1921	16.42	94.6
1922	18.44	106.3
1923	20.79	119.8
1924	24.76	142.6
1925	25.77	154.1

Chart (II) affords a graphic comparison of the farm real estate price and crop value indices. Crop values reached a peak in 1891 and then declined rather sharply to 1895, moving upward to 1898 and then breaking sharply downward in 1899. Real estate prices, on the other hand, moved upward until 1895 and then, in response to the continued depression in crop prices, moved downward, recovering somewhat in response to the now upward moving crop prices in 1898, but again turning downward with crop values in 1899. For this decade there appears to have been a pronounced lag of real estate prices behind crop values.

Beginning with 1900, crop values rose sharply for two years and then fluctuated about this new high level until 1906. Farm real estate prices

also moved upward in 1900 though less rapidly than crop values. Land prices, however, continued to rise while crop values fluctuated at the same level from 1901 to 1906, thus tending to close the gap between them. In 1907, crop values again took a spurt upward, rising to a high point in 1911, breaking sharply in 1912, and then rising again to a high point in 1914. Real estate prices responded to this movement with an accelerated rate of increase which approached the nature of a speculative boom in the period of 1910 to 1914. This boom is also evidenced by the relatively large number of farm transfers for these years.

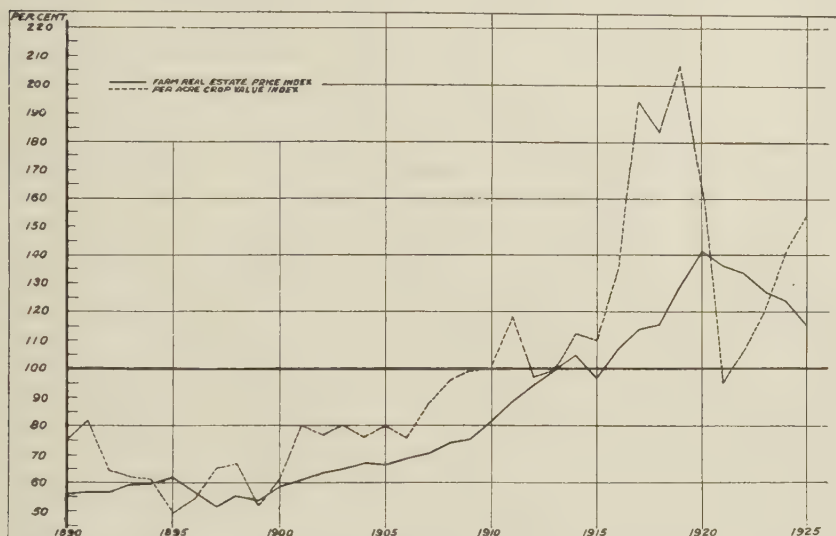


Chart II—Comparison of Farm Real Estate Price Index For Ingham County, Michigan, with the Per Acre Crop Value Index for the State

The reaction of farm real estate prices in 1915 is difficult to explain in view of the fact that crop values remained practically unchanged, though declining slightly. The fact that there was such a reaction is substantiated by real estate dealers conversant with the local conditions at the time. The explanation seems to lie in the uncertainties due to the outbreak of the war in Europe, the industrial depression, and the political outlook. Michigan is a Republican stronghold, and the farmers are ingrained with the notion that a change in the administration to the Democratic party is bound to result in depression. The slight decline in crop values coming at a time of caution and uncertainty, coupled with the adverse consequences prophesied as a result of putting the Federal Reserve System into effect, was sufficient to confirm the suspicion that the country was due for a period of depression.

By 1916, the demand for agricultural products by the foreign belligerents began to be felt, and crop values and prices mounted rapidly through 1919 and part of 1920. Land values responded but rose relatively little when compared to the great rise in crop values. Much has been said about the great rise in land values during the war period and the few years directly after the close of the war. It is true that land values did

mount rapidly, but when compared to crop values, the remarkable thing is that they did not mount to a much higher level in this section.

The crop value index shows a big decline for 1920, while the farm real estate price index reaches its highest point for the period in this year. At first hand this would seem to indicate that farm realty prices not only tend to lag in the extent of change, but because of this lag, have a certain amount of inertia which causes them to lag also as regards direction of change. This lag is quite pronounced in the earlier years of the period under consideration, but there is some uncertainty as regards 1919 and 1920. It must be borne in mind that the crop prices for each year are taken as of December first. Agricultural prices did not break until late spring and summer of 1920, so that if some earlier month were taken as the basis of price quotations, the crop value index would not register the sharp decline for 1920 it now does. On the other hand, the farm real estate price index is an annual index, and most sales of farms in 1920 were made in the early spring and summer. It would appear, then, that there was probably very little lag, if any, in the decline of farm real estate prices with crop values.

Following the sharp break and rapid descent of crop values in 1920 and 1921, farm real estate prices turned downward and continued to decline through 1925. Crop values, however, recovered somewhat in 1922 and moved upward rapidly to the end of the period. Taking only these two elements into consideration, it would be expected that farm real estate prices, too, should have recovered, or at least have been checked in their downward movement. Other elements, however, must be taken into consideration in the interpretation of this period.

In the first place, there are reasons for believing that the farm real estate price index does not accurately record the real decline in realty values for the period. The break in the inflationary period was more or less expected in the reaction of 1918, but when prices again mounted in 1919 and 1920, faith in the new high level of prices was so firmly established that no major decline appeared possible. The break in 1920-1921 was looked upon as a temporary reaction, so that, although a few farms were sold at slightly lowered prices, after all, very few sales occurred. The few sales that did occur were looked upon as bargains in view of the high prices in 1920. When the fallacy of expecting a return to the high prices of crops prevailing in 1919 and early in 1920 was finally accepted, the bottom literally dropped out of the farm land market. Very few sales for a cash consideration were made. Trades for urban property became the rule since both parties to the transaction could nominally hold their prices up to the 1920 level and apparently "get out from under" without recognizing a deflation in values. The few cash sales that were made and which serve as the basis of the index, seem to have been made at relatively high prices. A few farmers, many from other parts of the country, having sold their farms at high prices and desiring to return to active farming again, repurchased farms at the relatively high prices, reasoning that they were ahead of the game anyway. Those who had purchased at the higher levels could not and would not sell at greatly reduced prices, for in so doing, all of their equity and sometimes even more would be wiped out, making it impossible for them to re-engage in the industry elsewhere. For these reasons it seems that a

farm real estate price index based on actual sales will not accurately register the real drop in land values during a severe depression. The result is that the index will show a prolonged decline, rather than a sharp break and early recovery with other factors.

Several other factors need to be considered in connection with changes in farm real estate values, besides crop values, especially with reference to the war and post-war periods. As was pointed out in Chapter II, land prices tend to reflect net earnings from land. Crop values reflect gross earnings, and therefore, certain reductions must be made before net earnings are obtained. The chief reductions affecting the situation during the war and post-war periods are wages and taxes.

Wages did not decline to the same extent that other prices did in the period of deflation, but have remained at a comparatively high level. The automobile and other industries of Detroit and Lansing have drawn heavily upon the actual and potential farm labor supply, so that farm wages have had to be comparable to wages in these industries in order to attract workers. The desire for shorter hours and improved living conditions on the part of the farm workers has made the problem of farm labor in the section an acute one. At the same time, owner-operators of farms have also had the alternative possibility of becoming city wage earners. The result has been that the high level of industrial wages has tended to become the level also for farm wages in the section.

Tax data have been gathered for the farms included in the price index, but as yet have not been tabulated. These data, however, indicate that taxes in the county rose much more rapidly than did farm real estate prices during the war period and up until 1922. But taxes have not declined appreciably from this high level. This high level of taxes and wages, coupled with greatly lowered per acre crop values, explain the

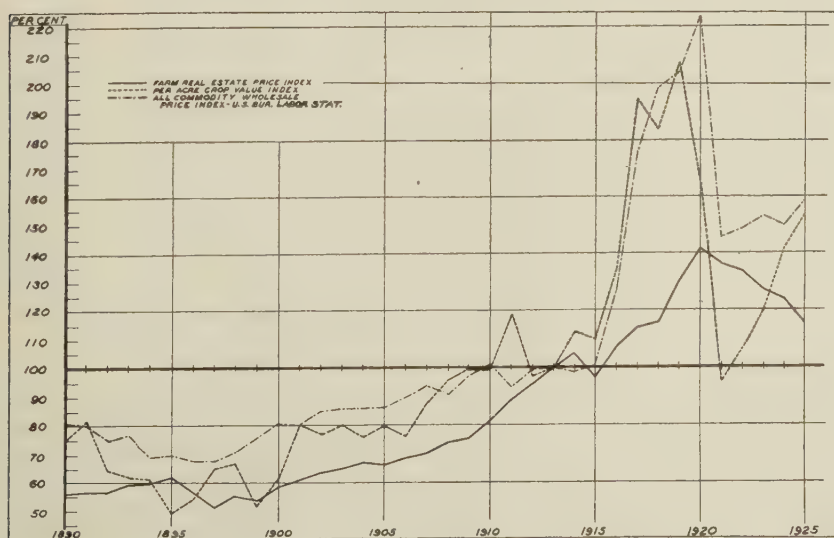


Chart III—Comparison of the Farm Real Estate Price Index for Ingham County, Michigan, with the Per Acre Crop Value Index for the State and the General Price Level.

continued decline of the farm real estate price index from 1920 through 1925.

Another element affecting the situation is the general price level. Chart (III) affords a comparison of the farm real estate price and crop value indices with the changing general price level. The Bureau of Labor Statistics, All Commodity, Wholesale Price Index is plotted to indicate the general price level. In connection with the post-war period, it will be noticed that crop values declined to a much greater extent than did general prices. Due to the inertia and relative stability of farm real estate prices, a continued decline in farm realty prices may be expected until the customary relationship between crop values and general prices is again reached, allowance being made for changes in the level of wages and taxes.

In some respects, a better picture of the changes in farm real estate prices and crop values is obtained by "deflating" these indices. This is done by dividing these series by the series representing the general price level. Table (X) lists the Bureau of Labor Statistics, All Commodity, Wholesale Price Index and the deflated farm real estate and crop value indices. These new series are plotted in Chart (IV).

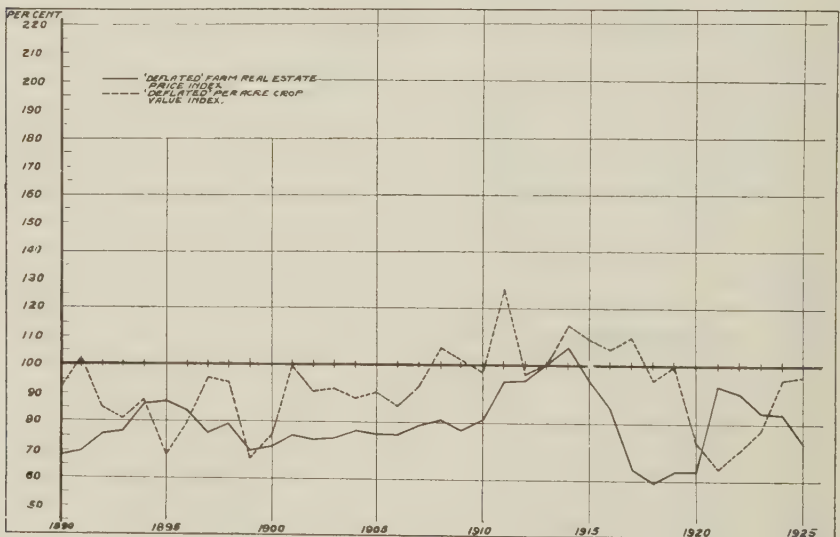


Chart IV—Comparison of the "Deflated" Real Estate Price Index for Ingham County, Michigan, with the "Deflated" Crop Value Index for the State.

The effect of deflating the farm real estate price index is to eliminate changes due to variations in the purchasing power of the dollar. The new series expresses changes in realty prices, not in terms of a 1913 dollar, but in terms of a dollar of constant purchasing power. Real and not merely nominal changes in the value of farm real estate are, therefore, reflected in the new series. The deflated crop value series indicates average changes in the exchange value of per acre crop yields as against commodities generally. This series is far more significant in reflecting changes in gross income on farms than the undeflated crop value index,

as farmers are not so interested in the number of dollars they obtain for their crops as they are in the amount of things they can obtain in exchange for these crops.

The deflated indices indicate very plainly the real rise in land values from 1907 to 1914, and how this rise came in response to the increasing exchange value of crops. The war period, however, shows up plainly as a period of decline in real land values. General prices rose much more rapidly than did either crop values or farm real estate prices, resulting

TABLE X.—Bureau of Labor Statistics, All Commodity, Wholesale Price Index with the Deflated Indices of Farm Real Estate Prices in Ingham County and Crop Values for the State of Michigan.

Year	Bureau of Labor Price Index	Farm Real Estate Price Index	Per Acre Crop Value Index
		÷ B. of L.	÷ B. of L.
1890	80.5	68.2	92.4
1891	80.0	70.1	102.4
1892	74.8	75.7	85.0
1893	76.6	76.8	80.5
1894	68.7	86.6	88.6
1895	70.0	87.5	68.2
1896	66.7	83.6	79.1
1897	66.8	76.0	95.7
1898	69.6	78.9	94.1
1899	74.9	69.7	67.4
1900	80.5	71.4	75.7
1901	79.3	75.4	99.9
1902	84.4	73.7	90.0
1903	85.5	74.3	92.5
1904	85.6	77.2	87.9
1905	86.2	76.0	91.8
1906	88.6	76.2	85.6
1907	93.5	73.7	93.5
1908	90.1	81.1	106.2
1909	96.9	77.2	102.1
1910	100.9	80.9	97.5
1911	93.0	94.7	127.6
1912	99.1	95.2	97.7
1913	100.0	100.0	100.0
1914	98.1	107.0	114.6
1915	100.8	95.8	109.1
1916	126.8	84.5	105.9
1917	177.2	64.1	109.8
1918	194.3	59.7	94.8
1919	206.4	63.2	100.7
1920	226.2	62.8	73.7
1921	146.9	93.3	64.4
1922	148.8	90.3	71.4
1923	153.7	83.0	77.9
1924	149.7	82.7	95.3
1925	158.7	72.5	97.1

in a relative decrease in the real values of these elements. A great increase in fundamental land values is indicated in 1921. This, however, is more apparent than real, as this result is obtained because of the great percentage decline in general prices and the relatively moderate decline in the farm real estate index. As was indicated above, the farm real estate price index probably does not indicate the real drop in realty values that took place in this period, but indicates rather that real estate prices will continue to decline more gradually and for a longer period than other elements in a deflationary period.

In general, the course of our deflated series indicates rather plainly the dependence of farm real estate prices on the purchasing power of crop yields. Farm real estate prices seem to lag to some extent, but much less in the later years than in the earlier years. The future course of farm real estate prices in this section will be of considerable interest. The relationship of crop values to general prices, and the course of wages and taxes seem to be the deciding factors influencing farm realty values in this locality. If taxes and wages become stabilized, as they apparently are at present, the fall in farm realty values will be checked only when crop values begin to close the gap between themselves and general prices.

The results of this experiment indicate the feasibility of constructing local farm real estate price indices. Perhaps some federal or state agencies, having a continuing interest in the variations of farm real estate prices, will be induced to construct similar indices for other localities and regions.

SUMMARY

Price indices, to reflect in a single expression the movements of prices up or down, have been constructed for most marketable commodities except land.

However, farms are as freely marketed as any other commodity. A farm real estate price index would assist in solving the question as to how far income determines land values; would help to forecast the future changes in land prices, give a more scientific basis for land mortgage credit and aid in valuing farm real estate for purposes of taxation.

Price data were secured from the records of land transfers in the office of the County Register of Deeds. These transfers were of the same farms and covered a period of 40 years. The farms involved were each visited so that correction for any changes from time to time could be made. Some 700 farms representing 48,838 acres are the basis for the index.

Farm price relatives were computed to show the percentage that later sales prices of a piece of land were of the first price. Link-relatives were then computed and these were chained into an index with 1913 as the base.

Correlations between movements of state crop prices and of land prices often show a lag on the part of the latter in responding to changes in the former. The dependence of farm real estate prices upon the purchasing power of crop yields is rather plainly indicated.

